

Notice of Allowability

Application No.

10/693,009

Examiner

Angela J. Martin

Applicant(s)

JORGENSEN ET AL.

Art Unit

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 2/2/06.
2. ☒ The allowed claim(s) is/are 1-13 and 15-17.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date <u>4/5/06</u> . |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. John Miller on April 5, 2006.

The application has been amended as follows:

Please cancel claim 14.

In claim 13, line 4, please delete "and" at the end of the line.

In claim 13, last line, please insert -- ; and a hydride bed having sufficient heat consumption to accept all the heat produced by the fuel cell, said compressed coolant from the compression device being applied to the hydride bed to heat a hydride therein and release hydrogen, said coolant from the hydride bed being applied to the expansion device -- after the last word of the last line : coolant .

REASONS FOR ALLOWANCE

2. The following is an examiner's statement of reasons for allowance:

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The Applicant claims a fuel cell system that includes a fuel cell stack through which a cooling fluid flows. A heat pump module receives the heated cooling fluid from the fuel cell stack and cools the heated cooling fluid that is then returned to the stack. The heat pump module includes a compression device that compresses the heated cooling fluid from the stack to raise its temperature and pressure, a cooling device for cooling the compressed and heated cooling fluid from the compression device and an expansion device for decreasing the pressure and temperature of the compressed cooled cooling fluid from the cooling device.

In the prior art of record, Kimbara et al., U.S. Pat. No. 6,605,377 B1, discloses a cooling apparatus for a fuel cell system. Kimbara et al., does not include a compression device that compresses a heated cooling fluid from a fuel cell stack, a cooling device that cools the heated and compressed cooling fluid from the compression device, and an expansion device that decreases the pressure and temperature of the cooled and compressed cooling fluid. The radiator is not included in the heat pump. The compressor does not receive the heated cooling fluid from the fuel cell and is not in the heat pump. Further, the heat pump does not include an expansion device. Kimbara et al. discloses a fuel cell system that includes a hydride bed. However, Kimbara does not teach or suggest using the hydride bed in association with a heat pump that includes a compression device, a cooling device and an expansion device that are used to reduce the temperature of a cooling fluid that flows through a fuel cell stack.

Itoh et al., U.S. Pat. No. 6,584,796 B2, disclose a heat pump that provides air conditioning for the passenger compartment of a vehicle. The vehicle

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includes a fuel cell that has a cooling fluid loop that directs the cooling fluid through a heater core. The heater core heats air forced into the passenger compartment of the vehicle through casing by using the heated cooling fluid used to cool the fuel cell stack. The heat pump is not in the cooling fluid loop of the fuel cell stack, and does not include a compression device, a cooling device and an expansion device in the order as claimed.

Gottmann et al., U.S. Pat. Application Pub. 2003/0157386 A1, discloses a power generation system that includes a heat pump that receives high temperature heat from a fuel cell stack to cool a data center. The compression device is a blower that provides air to a fuel cell, and is not associated with the heat pump.

However, the prior art of record, taken either alone or in combination, fails to disclose or render obvious a fuel cell system that includes a fuel cell stack through which a cooling fluid flows; heat pump module receives the heated cooling fluid from the fuel cell stack and cools the heated cooling fluid that is then returned to the stack; heat pump module includes a compression device that compresses the heated cooling fluid from the stack to raise its temperature and pressure, a cooling device for cooling the compressed and heated cooling fluid from the compression device and an expansion device for decreasing the pressure and temperature of the compressed cooled cooling fluid from the cooling device. Additionally, the prior art of record does not disclose a hydride bed in association with a heat pump that includes a compression device, a cooling device and an expansion device

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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Angela J. Martin whose telephone number is 571-272-1288. The examiner can normally be reached on Monday-Friday from 9:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AJM


PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER